A STUDY OF THE MICROBIOLOGICAL ENVIRONMENT OF THE RESPIRATORY INTENSIVE CARE UNIT, THE ROYAL VICTORIA HOSPITAL

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THE Respiratory Intensive Care Unit (R.I.C.U.) admits post operative patients from neuro-surgery and thoracic surgery. It also admits severely traumatised patients, and those suffering from fat embolism or tetanus who require assisted respiration in the form of increased oxygen tension or ventilation.

The Unit consists of seven cubicles and seven beds in an open ward. Each cubicle has a sink and also a "clean" and a "dirty" cupboard which communicate with the corridor. Most severely ill patients and those with infection are nursed in cubicles with a nurse in constant attendance. In the main ward severely ill patients also have a gowned and masked nurse in constant attendance, others, not so ill, share nurses.

Patients with tracheostomies are particularly liable to infection and this is usually treated prophylactically with antibiotics. *Pseudomonas aeruginosa* presents a particular problem in these circumstances since it is a free-living organism. It exists in a damp environment, can multiply at room temperature and is a common contaminant of ventilators, humidifiers and sinks. Attempts were made to isolate organisms from possible links in a cross infection route and from places which may harbour pseudomonas.

Results

The taps and bowls of four sinks in the main ward yielded coliform organisms and coagulase negative staphylococci only from the bowl of one. Pseudomonas was isolated from the drains of two and coliform organisms from the other, and organisms persisted in all four after cleaning. Six of twelve stethoscopes from individual beds of the unit yielded staphylococci, and from the staff of the casualty unit only one was sterile, three yielded staphylococci and two coliform organisms. After cleaning with 70 per cent isopropyl alcohol (Mediswab) only one yielded staphylococci. Two buckets and two mops examined before, during and after use yielded pseudomonas on five occasions and other organisms on six. The hands of two medical staff yielded staphylococci and five were sterile. One of two cleaners and one of two maintenance men had staphylococci on their hands.

Two cubicles were studied. In one where the patient had pseudomonas in his nose and tracheostomy tube the organism was found in the sink area and on the cuff of his sphygmomanometer. In another, vacated by a patient with pseudomonas in his tracheostomy tube, no organisms were recovered before, during or after fumigation and washing of the walls.

From an x-ray machine, dressing trolley, damp-dusting trolley, bed-pans, cleaned urinals and from screens no pathogens were isolated and only a few organisms were recovered mainly from the wheels. Individual tracheostomy toilet catheters stored in Savlon were sterile.

During the study no patients carried nasal or rectal pseudomonas on admission. Two patients, A and B, had pseudomonas infections at the start of the study which continued until they left the unit. One patient, C, two days after admission and tracheostomy was found to have pseudomonas in his nose, and two days later his tracheostomy was infected. On the last day of the study, another patient, D, was found to have pseudomonas in his nose fourteen days after admission and tracheostomy.

Samples of the *Pseudomonas aeruginosa* isolated were kept. At the end of the study period an attempt was made to type these by the method of Govan and Gilles (1969). This was not successful, probably due to the fact that during storage the main infecting strain was overgrown by other strains. Sensitivities were established for twelve antibiotics (Oxoid Multodisk), these showed seven patterns. One pattern was common to patients A and C but this pattern was not found in the mops and buckets.

Discussion

It appears from this study as from previous studies (Dexter 1971, Phillips et al 1971) that pseudomonas can exist in the environment and infect patients, particularly those who are severely ill and have tracheostomies, whereas less severely ill patients who might be exposed to the same organism do not succumb to the infection. Though pathogens were isolated from patients difficulty was experienced in determining the degree of infection. The usual indications of infection, pyrexia, tachycardia and leucocytosis, were frequently modified by the treatment of the patient, for example, induced hypothermia, morphine and blood transfusions.

The environment in the R.I.C.U. carries very few pathogens with the important exceptions of sinks, buckets and mops. Sinks are a well recognised source of the pathogens (Makela et al., 1972) and the only effective method of cleaning them is claimed to be a heated element in the drain. Rinsing with 1 per cent hypochlorite, a method recently introduced in the hospital, was not used in the unit at the time of study. A method of thoroughly drying mops and buckets should be found.

It was not possible to demonstrate the route of cross infection, although the antibiotic sensitivity patterns of the stains of pseudomonas found in the mops and buckets were those of multiple resistance. These could have included the more sensitive strains infecting patients A and C. The study also shows that stethoscopes (Gerken 1972) and sphygmomanometer cuffs could transmit organisms if they were not cleaned.

Summary

The Respiratory Intensive Care Unit was examined microbiologically. *Pseudomonas aeruginosa* was found in sinks and buckets, on mops and on a sphygmomanometer cuff of a heavily infected patient. Pyocine typing was unsuccessful in comparing these strains with those isolated from patients.

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BOOK REVIEW

AN INTRODUCTION TO MEDICAL GENETICS by J. A. Fraser Roberts. Sixth Edition. (Pp. xvi+310, figures 132, £3.50). London: Oxford University Press, 1973.

DR. FRASER ROBERTS' book needs no introduction to medical geneticists or interested clinicians. Since the first edition appeared over thirty years ago, *An Introduction to Medical Genetics* has remained by far the best first textbook on its subject and the sixth edition suggests that it still has no peer. It is hard to find the backbone of medical genetics more carefully and less pretentiously presented. As there are many books devoted to the molecular bases of heredity, molecular genetics is dealt with in the barest detail. The chapters on dominant, recessive, X-linked and intermediate inheritance are models of clarity and the chapter on linkage is an admirable introduction to this complex subject. The role of somatic cell genetics in establishing linkage in man is also briefly mentioned. Clinical aspects of chromosome abnormalities has been brought up-to-date and includes references to such new staining techniques as quinacrine mustard fluorescence and Giesma staining, which allow the precise identification of individual chromosomes. Inherited disorders and congenital malformations with a multifactorial basis will undoubtedly present one of the major challenges in human genetics in the next few decades. The section on multifactorial inheritance has been considerably expanded. The discussion on genetic counselling reflects the humane wisdom of a veteran practitioner in this increasingly important activity of medical geneticists. The place of transabdominal amniocentesis in the detection of genetic defects in the fetus *in utero* and in genetic counselling is also reviewed.

The book is admirably illustrated with photographs of a high quality. Unfortunately, the cost of the paper back production has risen from £1.75 to £3.50.

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